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(54) APPARATUS FOR APPLYING STARCH PASTE TO TOBACCO ARTICLES

EINRICHTUNG ZUM AUFBRINGEN VON STÄRKELEIM AUF TABAKWAREN

APPAREIL APPLICATEUR DE PATE D'AMIDON POUR PRODUITS A BASE DE TABAC

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- **RESEARCH DISCLOSURE. no. 134, June 1975,HAVANT GB pages 37- 38; "metering pump for the application of internal gum strips to wrapping paper for tobacco-smoke filters"**

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Descripti n

BACKGROUND OF THE INVENTION

In the manufacture of cigarette articles, tobacco is dispensed onto a moving belt or web, where it is shaped into a continuous rod. As the rod moves along the cigarette making apparatus, its brought into contact with a continuous length of cigarette paper, moving at the same speed. Various guides on the machinery fold one edge of the paper to wrap it around the tobacco rod, but leave the opposite edge, or "lap" standing upright so as to be exposed. At this point, glue is applied to the inside surface of the exposed edge portion, and thereafter machine guides fold the exposed edge portion so as to overlap the opposite edge of the paper, the glue thus adhering the opposite edges of the paper together.

Traditionally, the preferred glue for cigarette applications is starch paste. For starch paste to effectively seal the ends of the cigarette paper, however, it is necessary to apply the paste in a uniform, thin layer of a controlled amount.

At one time in the industry, paste was applied to the paper by dispensing it through a nozzle using pressure to control the volume. This worked for relatively slow speed machinery. But, as cigarette making machines became faster, machinery manufacturers replaced nozzle applicator systems with a paste wheel system, such as disclosed in U.S.-A-3,105,498, in order to improve the application of the paste on faster machines.

Conventional starch paste applicators, such as the Molins Mark IX starch paster, continue to use a paste wheel applicator. In the Molins apparatus, starch paste is supplied from a starch pot, which includes a moveable piston plate closing one end. A hydraulic ram, acting on the piston plate, forces paste from the starch pot, through a connecting line, to a paster nozzle. The nozzle is spring loaded against a concave wheel so as to apply a film of starch. The concave wheel, in turn, is in contact with the paste wheel so as to transfer paste to the paste wheel. Finally, the paste wheel contacts the cigarette paper lap so as to transfer paste to the cigarette paper.

The use of the double paste wheel transfer is intended to ensure that a uniform, controlled amount of paste is applied at the correct position to the paper lap. However, in order to function properly, the paste wheel system components must be adjusted to very close tolerances. Thus, the spring pressure on the nozzle must be adjusted to suit the consistency of the starch in use. The height of the paste wheel relative to the concave wheel must be set to ensure that the correct transfer of starch is achieved. The paste wheel periphery and concave surface of the concave wheel must be set parallel to and in contact with each other. Also, the paster position must be adjusted to apply the starch correctly onto the cigarette lap. In practice, the need for close adjustment tolerances causes a considerable amount of defective product ("pop opens") and down time of the cigarette making machinery. Also, the paste wheel systems include several high wear items. These items are expensive to replace, due to the precision required in machining the parts.

As cigarette making equipment improves, it would be desirable to operate at still higher speeds. However, the known starch paste applicator systems have proven inadequate for higher speed operations.

Because of the high incidence of defective products, or in order to speed up the manufacturing line, some manufacturers have switched from starch paste to a PVC-type of sealant. It would be desirable, however, to have a system capable of applying starch paste with better consistency, which is easier to adjust and operate, and which can function efficiently at higher speeds. It would also be desirable to reduce maintenance costs relative to the paste wheel systems.

US-A-2130689 discloses apparatus for applying starch paste to cigarette paper, comprising a nozzle and a valve for control of supply of paste directly to the nozzle.

The present invention is an apparatus for applying starch paste to tobacco wrapping paper using a pencil paste nozzle, which apparatus precisely regulates the pressure and flow rate of starch paste. According to the present invention, it is possible to apply starch paste directly from a nozzle to the cigarette paper lap at high speed, with great uniformity, and using a paste applicator system that requires minimum maintenance.

More particularly, the present invention is an apparatus for applying starch paste to the edge or lap of a cigarette paper. A paste nozzle is mounted to a machine which folds a continuous length of cigarette paper about a tobacco rod, in a manner so as to expose one edge of the paper, i.e. the "lap." The nozzle outlet is positioned adjacent to the lap to apply paste to the inside surface of the lap as the paper moves past the nozzle.

The nozzle includes a nozzle tip which is elongated in a direction perpendicular to the direction of paper movement. The nozzle has a bore of a cross section that permits the paste to flow from the nozzle at relatively little pressure drop, at a flow rate that will maintain a continuous film on the paper.

Means, such as the known paste pot and activating ram, supply starch paste to a high precision metering pump. The metering pump, in turn, supplies paste to the nozzle at a rate and pressure which is controlled responsive to the operating speed of the cigarette making machine. Preferably, the metering pump, is a mechanically driven, variable speed, fixed displacement pump, and is driven through a gear reducer off the making machine such that the pump speed is proportional to the line speed.

Preferably, one or more dust hoods are positioned just up line of the paster nozzle. Also, preferably a compressed air nozzle is directed at the tip of the paster nozzle. This acts to keep the nozzle tip clear of any loose tobacco particles that escape the dust hoods, and also cools the nozzle.

For a better understanding of the invention, reference is made to the following detailed description of a preferred embodiment, taken in conjunction with the drawings accompanying the application.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a top, schematic view of a portion of a cigarette making machine showing the paster nozzle;
Fig. 2 is a sectional view taken through lines 2-2 of Fig. 1;
Fig. 3 is a schematic view of the components of the paster system according to the invention;
Fig. 4 and 5 are front and side views, respectively, of a nozzle assembly according to the invention;
Figs. 6, 7, and 8 are top, front, and side views of the nozzle mounting block of Figs. 4-5; and
Figs. 9 and 10 are side and front views, respectively, of a nozzle according to the invention.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Fig. 1 shows a portion of a cigarette making machine 10 generally referred to as the garniture. Fig. 2 shows a sectional view of the portion containing the novel paste nozzle according to the invention.

The exemplary cigarette making machine 10 may be generally as shown and described in U.S. patent No. 3,105,498. A continuous tobacco rod 12 and wrapping paper 14 are moved along machine 10 (in the direction toward the left) in a groove 15 formed by a pair of converging guides 16, 18. The bottom of the groove 15 is arcuate shape and the guides 16, 18 act to gradually fold the paper 14 in a circular shape about the tobacco rod 12. A tongue 22 is provided to isolate the tobacco from the overhanging paper in the initial stages as it is folded.

Eventually, as shown in Fig. 2, the guides 16, 18 expose one edge, or lap 24, in an upright position, such that paste can be applied. Once the paste is applied, the ends of the paper 14 are folded about the tobacco rod 12 with the adhesive on lap 24 sealing the ends of the paper together. The foregoing type of garniture, with the exception of the novel paste applicator system of the present invention (described below), is well known, and any type of suitable garniture may be used with the present invention.

As shown in Figs. 1-2, a paste nozzle assembly 30, which receives starch paste through a feed line 31, is mounted on machine 10, and positioned such that the paste nozzle 32 is directed at the inside surface of the exposed lap 24 of paper 14. The nozzle 32 is positioned so that the tip is in contact with the paper. In addition, a compressed air nozzle 34, supplied through air line 35, is directed at the paste nozzle 32. Finally, one or more dust hoods 36 are positioned up line of the paste nozzle 32 for removing loose tobacco through a suction line 38.

Referring to in Fig. 3, starch paste is supplied from a paste pot 40 through a supply line 42 to a metering pump 44. Paste pot 40 may be the same as the known paste pot assemblies used with the Molins Mark IX, in which one end includes a moveable piston plate 46. As shown in Fig. 3, a pneumatic ram 48 presses against the piston plate 46 to push paste out through supply line 42. By use of a pneumatic drive, paste is extruded from the paste pot and supplied to the metering pump 44 at a constant pressure. The ram includes appropriate controls 49 for varying ram pressure and for retracting the ram (in order to change paste pots). The supply line 42 is preferably connected to the paste pot by a quick connect coupling to facilitate changing paste pots.

Metering pump 44 is preferably a high precision spinning pump having an output proportional to speed, such as Feinpruf model SPSO582AAZ,N19 having a capacity of 0.6 cc/rev. The pump is provided with a manual feed wheel 50; which is used to bleed air from the paste line when paste pots are changed.

Metering pump 44 is driven by a gear reducer 52, which is connected to a gear drive 54. A gear reducer such as Browning model SM133C1 may be used. Gear drive 54 is connected to the drive of the cigarette making machine, as indicated schematically, so as to have a rotational speed proportional to the speed of the maker, i.e. proportional to the speed of the moving cigarette paper and tobacco rod. Any suitable gear, pulley, chain or other connection may be used. Existing Molins Mark IX equipment has a gear drive, and such may be used in the present invention to drive the gear reducer 52.

Referring to Figs. 4-5, which show an example of a paste nozzle assembly 30, a mounting block 60 includes a pair of holes 62, which may be used to attach the block 60 to the garniture 10, and a threaded hole 64 for securing the upper part of the assembly. The upper face of the block 60 includes guides 66 for seating a nozzle housing 68, described further below. Nozzle housing 68 is secured to the mounting block 60 by a knurled fastener 70, the threaded shaft of which extends through a bore 72 in the nozzle housing 68 and is screwed into the threaded hole 64 in the mounting block. This permits the nozzle housing to be removed easily when desired, and to be re-mounted precisely in position.

As shown in Figs. 6-8 the nozzle housing 68, which is preferably brass, includes, in addition to bore 72, a threaded intake hole 74 and a threaded nozzle mounting hole 76. The intake hole 74 and nozzle mounting hole 76 communication with one another in the region indicated 80. The holes 74, 76 are laterally offset from one another, since they are oriented at different angles, and this also allows room for bore 72. The bottom of the housing 68 includes laterally opposed cutouts, that cooperate with the seating guides 66 in the mounting block 60.

Hole 74 is threaded so as to receive a threaded coupling 31a from the metering pump supply line 31, whereas the hole 76 is threaded to receive the threaded

end of the nozzle. As shown in Figs. 5 and 8, the hole 76 is angled down about 6° relative to horizontal to point the nozzle down. The purpose of this is to match the angle of the paper, which in the Molins Mark IX machine is at a slight angle to vertical. By orienting the nozzle in this manner, the tip of the nozzle is perpendicular to the paper. If used in equipment where the lap is a different angle, the angle of the nozzle should be adjusted accordingly so that the nozzle tip remains perpendicular to the paper. Also, as shown in Fig. 6, in the horizontal plane the nozzle hole 76 is not exactly perpendicular to the direction of paper travel, but rather is angled about 6° - 7° back away from the direction of paper travel, i.e., so as to lie at about 83° to 84° relative to the direction of paper travel, which has been found to improve the application of paste.

Referring to Figs. 9-10, a pencil paster nozzle 32 according to the invention preferably is made of stainless steel and includes a threaded end 80, which is screwed into the nozzle mounting hole 76. The dimensions of the nozzle bore are selected so that the paste flows from the nozzle at relatively low pressure, at a flow rate that will maintain a continuous film on the paper. The cross-sectional flow area through the nozzle bore is sufficient so that the paste flows from the nozzle at a relatively low velocity, to allow the nozzle to remain in contact with the paper.

In an illustrative example, the threaded end 80 and nozzle tube 82 include a 5/65" bore 84 therethrough, except that at the outer end of the nozzle tube 82 the bore is enlarged to 7/64" for a distance of 1/4" from the tip. A nozzle tip 86, which has an outside diameter matching the enlarged end bore 88 of tube 82 (i.e. 7/64"), is press fit into the enlarged end bore 88. The tip 86 includes an internal bore 90 therethrough of the same diameter as the tube bore 84, i.e. 5/64". As shown in Fig. 10, opposite sides 92 of the nozzle tube 82 have flats 89, to permit the use of a wrench when tightening the nozzle assembly in the hole 76.

Prior to using the nozzle, it has been found preferable to squeeze the tip to make it oblong, e.g. with a dimension of 3.8 mm x 2.0 mm, with the longer dimension oriented perpendicular to the direction of paper travel. By thus elongating the nozzle tip, it has been found that a more uniform application of paste is achieved than in the case of a round tip.

To set up the apparatus, the tip 86 of the nozzle 32 is initially polished in the direction of paper traveling using crocus cloth TR3. The purpose of this is to remove small grooves through which leakage could occur. The threaded end 80 of the nozzle 32 is then screwed into the nozzle housing 68, together with the supply line connector 31a. As noted above, the longer dimension of the oblong nozzle tip should be positioned vertically, perpendicular to the direction of paper travel. The housing 68 is positioned on the mounting block 60 and secured in place by the knurled fastener 70.

To initialize the flow of paste, a paste pot 40 is installed in the pneumatic ram assembly and the ram is actuated. The manual feed wheel on the metering pump 44 is then turned to feed paste to the nozzle 32 until such time as air is removed from the supply lines. At such time, the cigarette making machine can be started, and paste will be supplied by the metering pump 44, at the appropriate rate depending on machine speed.

As the paper moves, it rubs up against the nozzle. The characteristics of the metering pump, gear reducer, pneumatic ram, and nozzle, are selected so that paste flows out of the nozzle tip at a relatively low pressure, at a rate (speed dependent) at which it will form a thin uniform film on the paper. By using a system according to the invention, it is possible for a particular type of paste, to provide sufficiently accurate control to ensure that the paste flows from the nozzle in an amount that will maintain a continuous film on the paper, and avoid excess delivery (which is undesirable) or insufficient delivery (which would cause discontinuities in the film and result in pop opens).

The pneumatic ram pressure is set to ensure a sufficient flow of paste to the metering pump. If, due to batch-to-batch variance in paste consistency, insufficient paste is delivered to the pump, the ram pneumatic pressure is increased to compensate.

The foregoing is a preferred embodiment of the invention.

Claims

1. Apparatus for applying starch paste to an exposed edge of moving cigarette paper, comprising a paster nozzle (30,32) having an outer tip (86) positioned for a portion thereof to be in contact with the exposed edge of the cigarette paper for applying paste along the edge, and means (40,44) for supplying paste to the nozzle at a controlled rate and pressure, characterised in that said means (40,44) comprises a high precision metering pump (44) for supplying paste to the nozzle (30,32) at a controlled rate and means (40) for supplying starch paste to the high precision metering pump (44) at a controlled pressure and in that the nozzle (30,32) has an internal bore (84,90) sized for delivering paste at a relatively low pressure and at a rate for applying a thin, uniform film of paste to the edge as the paper moves paste the tip (86) and in that the tip (86) is elongated in cross-section and oriented such that the longer dimension is substantially perpendicular to the direction of paper movement.

2. Apparatus according to claim 1, wherein said nozzle includes a nozzle tube, wherein said outer tip comprises a nozzle tip disposed in said nozzle tube, and wherein the internal bore through said nozzle tube and said nozzle tip are of the same diameter.

3. Apparatus according to claim 1 or claim 2 wherein the portion of the tip (86) positioned to be in contact

with the paper has been polished in the direction of paper movement.

4. Apparatus according to any one of the preceding claims wherein the tip bore has its axis oriented at an angle of 83° to 84° relative to the direction of paper travel.

5. A high speed machine (10) for folding and sealing a continuous length of cigarette paper (14) about a tobacco rod (12) comprising apparatus according to any one of the preceding claims and a garniture for exposing one edge of the paper to define a lap (24), wherein the nozzle tip (86) is positioned to contact the lap (24) for applying starch paste thereto.

6. A machine (10) according to claim 5 wherein the metering pump (44) comprises a high precision rotary pump and which machine comprises means (52, 54) for coupling rotating speed of the pump to speed of movement of paper past the nozzle.

7. A machine (10) according to claim 5 or claim 6 which comprises means for varying operation speed, wherein the metering pump (44) supplies paste to the nozzle (30,32) at a rate proportional to the machine operating speed.

8. A machine according to any one of claims 5 to 7 comprising a nozzle housing (68) for receiving the nozzle and a mounting block (60) on the machine (10) for removably mounting the nozzle housing (68).

Patentansprüche

1. Vorrichtung zum Aufbringen von Stärkekleister bzw. -leim auf eine(n) frei liegende(n) bzw. exponierte(n) Rand bzw. Kante von bewegtem Zigarettenpapier, umfassend eine Kleisterdüse (30, 32) mit einer Außenspitze (86), die so angeordnet ist, daß ein Abschnitt davon mit dem freiliegenden Rand des Zigarettenpapiers in Kontakt steht, um entlang des Randes Kleister aufzubringen, sowie Mittel (40, 44) zum Zuführen von Kleister mit geregelter Geschwindigkeit bzw. Menge und unter geregeltem Druck zur Düse, dadurch gekennzeichnet, daß das Mittel (40, 44) eine Hochpräzisionsdosierpumpe (44) zum Zuführen von Kleister mit geregelter Geschwindigkeit bzw. Menge zur Düse (30, 32) und Mittel (40) zum Zuführen von Stärkekleister unter geregeltem Druck zur Hochpräzisionsdosierpumpe (44) umfaßt, und dadurch, daß die Düse (30, 32) eine Innenbohrung (84, 90) mit einer solchen Größe aufweist, daß Kleister unter relativ geringem Druck und mit einer solchen Geschwindigkeit bzw. Menge abgegeben wird, daß ein dünner, gleichmäßiger Kleisterfilm auf den Rand bzw. die Kante aufgebracht wird, während sich das Papier an der Spitze (86) vorbeibewegt, und dadurch, daß die Spitze (86) einen länglichen Querschnitt aufweist und so ausgerichtet ist, daß die längere Abmessung im wesentlichen senkrecht zur Richtung der Papierbewegung verläuft.

2. Vorrichtung nach Anspruch 1, worin die Düse ein Düsenrohr umfaßt, worin die Außenspitze eine im Düsenrohr angeordnete Düsenspitze umfaßt und worin die Innenbohrung durch das Düsenrohr und die Düsenspitze den gleichen Durchmesser aufweisen.

3. Vorrichtung nach Anspruch 1 oder 2, worin jener Abschnitt der Spitze (86), der so angeordnet ist, daß er mit dem Papier in Kontakt steht, in Papierbewegungsrichtung poliert wurde.

4. Vorrichtung nach einem der vorangegangenen Ansprüche, worin die Achse der Spitzenbohrung in einem Winkel von 83° bis 84° relativ zur Papierbewegungsrichtung ausgerichtet ist.

5. Hochgeschwindigkeitsmaschine (10) zum Falten und Abdichten einer kontinuierlichen Länge von Zigarettenpapier (14) um einen Tabakstab (12) herum, umfassend eine Vorrichtung nach einem der vorangegangenen Ansprüche und einen Besatz zur Freilegung eines Randes bzw. einer Kante des Papiers, um eine Überlappung bzw. Lage bzw. Wickel (24) zu definieren, worin die Düsenspitze (86) so angeordnet ist, daß sie mit der Überlappung (24) in Kontakt steht, um Stärkekleister darauf aufzubringen.

6. Maschine (10) nach Anspruch 5, worin die Dosierpumpe (44) eine Hochpräzisionsrotationspumpe umfaßt, und welche Maschine Mittel (52, 54) zum Koppeln der Rotationsgeschwindigkeit der Pumpe an die Bewegungsgeschwindigkeit von Papier an der Düse vorbei umfaßt.

7. Maschine (10) nach Anspruch 5 oder 6, die Mittel zum Variieren der Betriebsgeschwindigkeit umfaßt, worin die Dosierpumpe (44) zur Düse (30, 32) Kleister mit einer Geschwindigkeit zuführt, die proportional zur Betriebsgeschwindigkeit der Maschine ist.

8. Maschine nach einem der Ansprüche 5 bis 7, umfassend ein Düsengehäuse (68) zum Aufnehmen der Düse und einen Montageblock (60) auf der Maschine (10), um das Düsengehäuse (68) abnehmbar zu montieren.

Revendications

1. Appareil pour appliquer une pâte d'amidon sur un bord exposé d'un papier à cigarette mobile, com-

prenant une tuyère pour pâte (30, 32) ayant une buse externe (86) positionnée de façon qu'une portion de celle-ci soit en contact avec le bord exposé du papier à cigarette pour appliquer la pâte le long du bord, et des moyens (40, 44) pour délivrer la pâte à la tuyère à un débit et une pression contrôlés, caractérisé en ce que lesdits moyens (40, 44) comprennent une pompe de dosage à haute précision (44) pour délivrer la pâte à la tuyère (30, 32) à un débit contrôlé et un moyen (40) pour délivrer la pâte d'amidon à la pompe de dosage à haute précision (44) à une pression contrôlée et en ce que la tuyère (30, 32) a un alésage interne (84, 90) dimensionné pour délivrer la pâte à une pression relativement basse et à un débit pour appliquer une fine pellicule uniforme de pâte sur le bord pendant que le papier se déplace devant la buse (86) et en ce que la buse (86) est allongée en coupe transversale et orientée de façon que la plus longue dimension est sensiblement perpendiculaire à la direction de déplacement du papier.

2. Appareil selon la revendication 1, caractérisé en ce que ladite tuyère comprend un tube de tuyère, en ce que ladite buse externe comprend une buse de tuyère disposée dans ledit tube de tuyère, et en ce que l'alésage interne à travers ledit tube de tuyère et ladite buse de tuyère ont le même diamètre.

3. Appareil selon la revendication 1 ou 2, caractérisé en ce que la portion de la buse (86) positionnée de façon à être en contact avec le papier a été polie dans la direction de déplacement du papier.

4. Appareil selon l'une des revendications précédentes, caractérisé en ce que l'alésage de buse a son axe orienté suivant un angle de 83 à 84° par rapport à la direction de déplacement du papier.

5. Machine à haute vitesse (10) pour plier et coller une longueur continue du papier à cigarette (14) autour d'une tige de tabac (12), comprenant l'appareil selon l'une des revendications précédentes et une garniture pour exposer un bord du papier en définissant une nappe de recouvrement (24), caractérisée en ce que la buse de tuyère (86) est positionnée pour venir en contact avec la nappe (24), pour y appliquer la pâte d'amidon.

6. Machine (10) selon la revendication 5, caractérisée en ce que la pompe de dosage (44) comprend une pompe rotative à haute précision, laquelle machine comprend des moyens (52, 54) pour coupler la vitesse de rotation de la pompe à la vitesse de déplacement du papier devant la tuyère.

7. Machine (10) selon la revendication 5 ou 6, qui comprend des moyens pour faire varier la vitesse de fonctionnement, caractérisée en ce que la pompe de dosage (44) délivre la pâte à la tuyère (30, 32) à un débit proportionnel à la vitesse de fonctionnement de la machine.

8. Machine selon l'une des revendications 5 à 7, comprenant un boîtier de tuyère (68) pour recevoir la tuyère et un bloc de montage (60) sur la machine (10) pour monter de manière amovible le boîtier de tuyère (68).

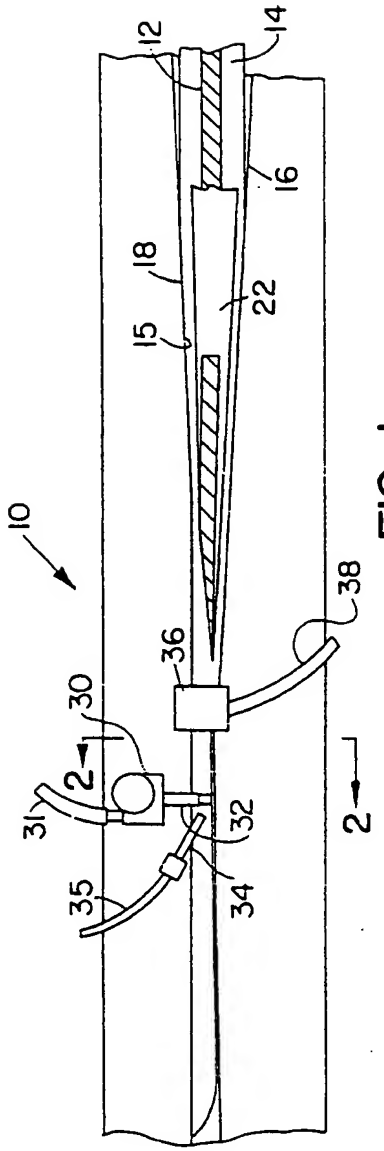

FIG. 1

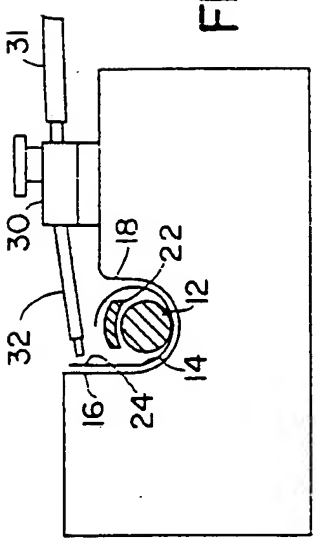

FIG. 2

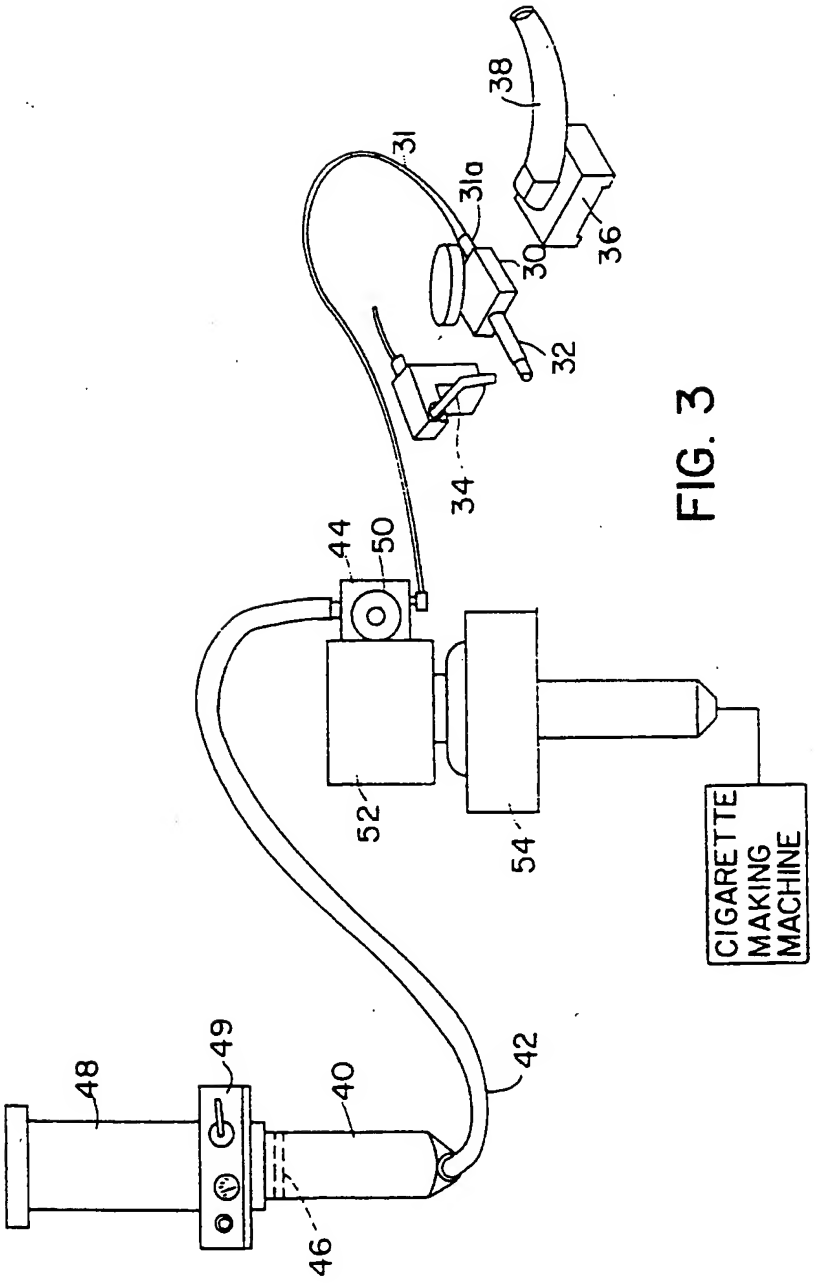
38
31
31a
36
30
32
34
44
50
52
54
CIGARETTE MAKING MACHINE
42
48
49
40
46

FIG. 3

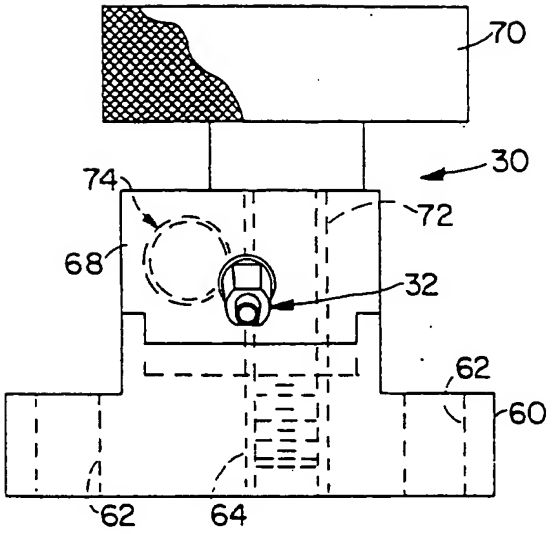

FIG. 4

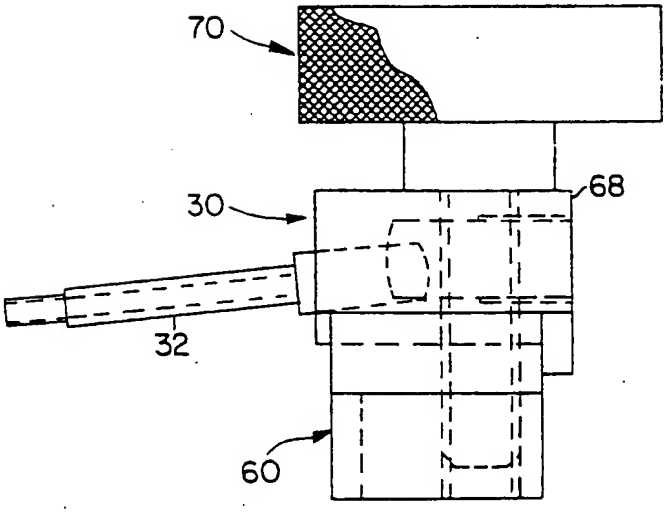

FIG. 5

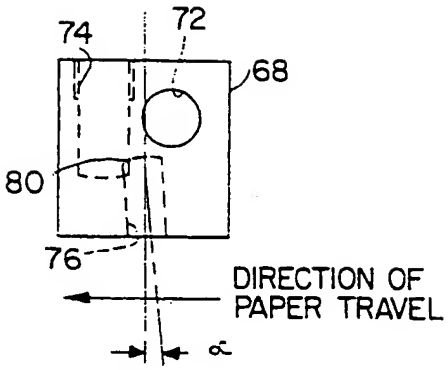

FIG. 6

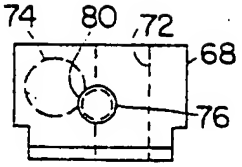

FIG. 7

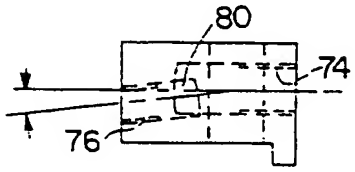

FIG. 8

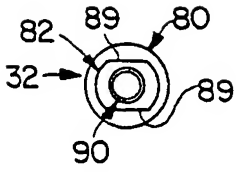

FIG. 10

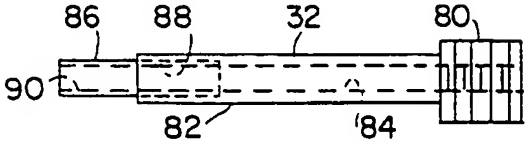

FIG. 9